

QUESTIONS AND ANSWERS CONCERNING WHITE PINE BLISTER RUST

1. Q. What is white pine blister rust?
A. It is a plant parasite (fungous disease) which attacks the white or five-needled pines and spreads on alternate host plants, currant and gooseberry bushes. Currant and gooseberries are known in control work under the general term "Ribes".
2. Q. Does the disease attack other plants?
A. It attacks only white pines and Ribes.
3. Q. How does it affect the white pine?
A. It kills the white pine. The disease enters the pine through the needles and grows in the inner bark. From one to three years after infection it becomes visible as a reddish brown discoloration of the bark accompanied by a slight swelling. After one or two years additional development small whitish sacs burst through the diseased bark in the spring of each year. These sacs break open liberating an orange-colored rust which consists of millions of tiny spores or seed-like bodies which are scattered by the wind to infect Ribes. The canker continues to develop and will fruit or produce spores until the tree has been killed by girdling.
4. Q. How does the disease appear on the Ribes?
A. The rust appears in the spring and early summer as orange-colored spots on the lower surface of the leaf. Spores produced at this stage cannot infect the pines but can cause additional infection on the leaf or spread the disease from leaf to leaf and bush to nearby bush. During the summer and fall small hair-like structures grow from the diseased area on the leaf. These hair-like columns produce the pine-infecting spores. At this stage the infection is dark brown in color.
5. Q. Can the disease spread from pine to pine?
A. No. It can spread only on Ribes. It is impossible for the spores produced on infected pines to infect other pines. These spores can infect only the Ribes and no other types or species of shrub. The spore produced on infected Ribes can infect only the five-needled or white pines.
6. Q. What is the distinguishing characteristic of the white pines?
A. White pines have five needles growing in a bundle. The yellow pine has three needles, the jack pine or lodgepole pine two needles in a bundle.
7. Q. What is the agency which carries the disease?
A. The spores are carried by the wind. Any spread by birds and

rodents is negligible in comparison.

8. Q. Where did the disease originate?

A. It is believed to have originated on the stone pine (Pinus cembra) in Asia.

9. Q. Where was the disease first discovered?

A. It was discovered in 1854 on both pine and Ribes in the northern part of European Russia.

10. Q. Has it done much damage in Europe?

A. It has spread through all of the white pine stands in western Europe and has done so much damage that reforestation with white pine has been discontinued. The presence of this disease in any white pine region will make it impossible to grow these trees without protection measures.

11. Q. When was the disease introduced into the United States?

A. About 1898 we started to import nursery stock from Europe. Some of this stock was diseased and in this way the rust was introduced into this country.

12. Q. Did the disease spread to the West from the eastern infection centers?

A. No. It came into Vancouver, B.C. in 1910 on nursery stock imported from France.

13. Q. When did the disease come into the Inland Empire?

A. It became established in the white pine belt of the Inland Empire in 1923 at 15 known locations. It was not discovered until the fall of 1927 when it was found on Ribes on the Kaniksu National Forest. It was located on pine at Newman Lake, Washington, in May 1928. Ribes infections have been found generally distributed over the white pine belt and 208 locations of pine infection have been discovered in the Inland Empire.

14. Q. How far south has the rust spread?

A. From Vancouver, B.C. it has spread south through the coastal region of Washington and Oregon to California. It is still in the introductory stage in southern Oregon and was found in California for the first time in 1936 on both Ribes and pine about five miles south of the Oregon-California line.

15. Q. Were any measures taken to prevent its rapid spread to the commercial white pine belts?

A. Yes. These delay measures were two-fold:

1. Quarantine laws were enforced prohibiting the shipment of pines and Ribes from infected to non-infected areas.
2. Following the discovery of the rust in the West cultivated black currant bushes were eradicated from Montana, Idaho, Washington, Oregon, and California.

16. Q. Were these delay measures effective?

A. Yes. The quarantine laws ensure that infected host plants will not be shipped to disease-free areas. They are still being enforced. The eradication of the European or cultivated black currant has undoubtedly helped to delay the rapid spread of the disease. This species of currant is the most susceptible to the rust and becomes infected from long distance spread. In 1917 for example, the rust spread from the coast to Revelstoke on the Columbia River in the interior of British Columbia.

17. Q. How far will the disease spread?

A. From pine to Ribes it can spread 200 miles or more. From Ribes to pine however it can spread only a few hundred yards. The spore produced on the Ribes has extremely thin walls and lives for a much shorter period than the spore produced on the pine.

18. Q. Can blister rust be controlled?

A. Yes. As it can spread only on Ribes we can control this disease by eliminating the Ribes. On account of the very short distance spread from Ribes to pine we can concentrate protection work on pine areas which bear or will bear the more valuable stands of pine. With the eradication of Ribes the pine is protected.

19. Q. How are the Ribes eradicated?

A. The bushes growing on the hillsides, away from streams or in other words, in the upland types, are pulled by hand or with the aid of a grub hoe. The bushes are placed on stumps, logs or brush to dry out and die. The larger bushes not readily pulled by hand and those under logs or growing in rocks are killed by cutting away the branches and part of the root crown and applying a small quantity of chemical or Diesel oil to the mutilated crown.

In the stream type and swampy areas where the wild black currant is abundant it is eradicated by spraying with chemicals.

Heavy brush areas containing several hundred white-stemmed gooseberry bushes per acre are cleared by a machine method using a bulldozer equipped with a special blade for uprooting brush. This work is confined to bottom land along streams. Less exten-

sive areas of heavy brush which interfere with hand-pulling the white-stemmed gooseberry are cleared by hand-slashing, men cutting the brush and pulling the Ribes by hand as the brush is cleared away. This method is expensive and is used only when no other method will result in satisfactory eradication work.

20. Q. Are white pines of commercial value in the West?

A. The white pines are the most valuable forest trees in the West. The principal commercial species are the western white pine (Pinus monticola) found in the Inland Empire and the Cascade Mountains of Washington and Oregon and the sugar pine (P. lambertiana) found in southern Oregon and California. The limber pine (P. flexilis), the white bark pine (P. albicaulis) and the bristle-cone pine (P. aristata) are of some commercial value in Colorado and Wyoming but are of considerably greater value for watershed protection, soil conservation and recreational use.

21. Q. How many acres of white-pine type are there in the West?

A. In the Inland Empire the control area comprises 2,710,000 acres, in Oregon 195,000 acres and in California 2,004,000 acres. The extent of the control areas in Colorado and Wyoming has not been definitely determined as preliminary survey work was not started until 1934. Control work was begun in these states in 1935.

22. Q. How many acres have been worked?

A. In the Inland Empire the first working has been completed on 1,621,046 acres, second working on 72,575 acres and third working on 4,421 acres.

In Oregon first working has been done on 114,957 acres, second working on 8,808 acres and third working on 244 acres.

In California first working has been accomplished on 440,323 acres, second working on 30,195 acres and third working on 4,893 acres.

In Colorado first working has been completed on 7,848 acres and in Wyoming on 18,188 acres.

23. Q. Why are second and third workings necessary?

A. In order to answer this question it is necessary to explain the life-history of Ribes in timber stands. As the timber matures these bushes are gradually shaded out. They have dropped seeds which lie dormant in the duff and germinate or start to grow when the forest shade is removed and the ground disturbed by logging or fire. For some time the bushes are on the increase; then for a period they neither increase nor decrease in numbers being more or less in equilibrium; then as the timber canopy

closes in they are definitely on the decrease.

In areas where the Ribes are on the decrease one working is sufficient to protect the pine, in areas where the Ribes are in general neither increasing nor decreasing two workings are sometimes necessary and in areas where the Ribes are on the increase three workings may be necessary.

24. Q. Has anything been done to eradicate the disease from infected trees?

A. No. It takes from one to three years for infection to become visible on the pine. If the visible cankers were cut out there would probably be other cankers developing on the trees. It is better to let the infected trees go and protect the healthy pines by eradicating the disease carriers, Ribes.

25. Q. What is the total stumpage value of white pines in the West?

A. In the West there are 19,500,000,000 board feet of mature western white pine and 35,500,000,000 board feet of mature sugar pine. Stumpage values range from \$4.00 to \$12.00 per thousand board feet. At the 1930 average stumpage values of \$4.93 per thousand board feet for western white pine and \$5.47 per thousand board feet for sugar pine the total value of western white pine is \$96,135,000 and the total value of sugar pine \$194,185,000. These values are represented in standing mature timber. There is vast potential or future wealth in younger stands which will not grow to maturity unless they are protected against blister rust.

Division of Plant Disease Control
Bureau of Entomology and Plant Quarantine
618 Realty Building
Spokane, Washington
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